

**WHAT IS CLAIMED IS:**

1. A micro pump using ferro-fluid/magneto-rheological fluid for driving a working fluid, the micro pump comprising at least a micro pump component, wherein the micro pump component comprising:

5           a body having an accommodating space and an opening for communicating with to the accommodating space;

          a membrane formed in the accommodating space for separating the accommodating space into a first space and a second space, in such a way that the opening communicates the second space;

10           a ferro-fluid/magneto-rheological fluid filled in the first space; and

          a magnetic field generating unit for applying a magnetic field to the accommodating space, so that to deform the membrane via the ferro-fluid/magneto-rheological fluid to drive the working fluid to flow in/out of the opening.

2. The micro pump of claim 1, wherein the membrane is a  
15 polydimethylsiloxane (PDMS) membrane.

3. The micro pump of claim 1, wherein the body comprising a first body and a second body so that the accommodating space is formed from recessed portions of the first and second body.

4. The micro pump of claim 1, wherein two openings are formed on the body to  
20 serve as an entrance and an exit for the working fluid to flow in and out of the second space.

5. The micro pump of claim 4, wherein the opening includes a diffuser and a nozzle.

6. The micro pump of claim 4, further comprising an opening control device formed on the opening to open the exit and close the entrance when the working fluid is required to flow out of the opening, and to open the entrance and close the exit when the working fluid is required to flow in the opening.

5        7. The micro pump of claim 6, wherein the opening control device comprising a ferro-fluid/magneto-rheological fluid whose position shift is driven by a magnetic field.

8. The micro pump of claim 1, wherein the body is a silicon substrate.

9. The micro pump of claim 1, wherein the magnetic field generating unit is installed in the body.

10       10. The micro pump of claim 1, wherein the magnetic field generating unit is a electromagnet switch.

11. A micro pump using ferro-fluid/magneto-rheological fluid is applicable to driving a working fluid, the micro pump having at least a micro pump component and each of the micro pump component comprising:

15       a body having at least an accommodating space and an opening communicates with the accommodating space;

at least two ferro-fluid/magneto-rheological fluid components disposed on two corresponding sides of the accommodating space; and

a magnetic field generating unit for driving the at least two ferro-fluid/magneto-rheological fluid components, so that the ferro-fluid/magneto-rheological fluid components are shifted constantly to drive the working fluid flowing in/out of the opening.

12. The micro pump of claim 11, wherein the ferro-fluid/magneto-rheological fluid component is a ferro-fluid/magneto-rheological fluid immiscible to the working fluid.

13. The micro pump of claim 11, wherein the ferro-fluid/magneto-rheological fluid component is a ferro-fluid/magneto-rheological fluid encapsulated by the membrane.

14. The micro pump of claim 11, wherein the membrane is a polydimethylsiloxane (PDMS) membrane.

15. The micro pump of claim 11, wherein two openings are formed on the body to serve as an entrance and an exit for the working fluid to flow in and out of the second space.

16. The micro pump of claim 15, wherein the opening includes a diffuser and a nozzle.

17. The micro pump of claim 15, further comprising an opening control device formed on the opening to open the exit and close the entrance when the working fluid is required to flow out of the opening, and to open the entrance and close the exit when the working fluid is required to flow in the opening.

18. The micro pump of claim 17, wherein the opening control device comprising a ferro-fluid/magneto-rheological fluid whose position shift is driven by a magnetic field.

19. The micro pump of claim 11, wherein the body is a silicon substrate.

20. The micro pump of claim 11, wherein the body further comprising a top lid such that the magnetic field generating unit is formed on the top lid.

21. The micro pump of claim 11, wherein the magnetic field generating unit is a movable magnet capable of driving position shifting of the ferro-fluid/magnetorheological fluid.

22. The micro pump of claim 11, wherein magnetic field generating unit is a sequential actuating electromagnet arranged in an array.

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